NMENT

memorandum

DATE: June 10, 1981

REPLY TO ATTN OF: Chief, Central Laboratory, WRD, Denver, CO

SUBJECT: REPORTS AND STATISTICS - Water Quality: Results of the St. Louis Park water samples

TO: District Chief, WRD, Minneapolis MN
Attn: Marc Hult, WRD, St. Paul, MN

The custom analysis on six water samples from the St. Louis Park area have been completed.

The methods, procedures, and results for polynuclear aromatic hydrocarbons (PNA) by liquid chromatography are described in Chemist's Report I and by gas chromatography/mass spectrometry (GC/MS) in Chemist's Report II. Other organic compounds tentatively identified by GC/MS are reported in Chemist's Report II.

CHEMIST'S REPORT I

Six water samples (SLP #4, SLP #15, W-117, Flame Ind., W-13, and P-14) from Minnesota were each extracted with three - 40 mL portions of high performance liquid chromatographic (HPLC)-grade methylene chloride. The sample and the bottle were weighed before and after extraction. The methylene chloride extract was dried over sodium sulfate in a dark, explosion-proof refrigerator, for 2 hours or longer. (Previously, the sodium sulfate had been burned at 350°C for approximately 12 hours.) One-half milliliter HPLC-grade acetonitrile was added to the organic extract which was reduced to approximately 4 mL in a Kuderna-Danish (K-D) concentrator.

Special treatment was required with sample W-13. The interface between the methylene chloride and the aqueous layer on W-13 was not clearly discernable. A maximum amount of methylene chloride was removed from the separatory funnel without collecting any of the emulsified aqueous portion. Since some methylene chloride remained emulsified with the discarded aqueous layer, a portion of some constituents were lost. Therefore the reported values on W-13 are considered "minimum" values.

Sample P-14 was not concentrated after the K-D concentration step. The other samples were concentrated below 4 mL using an evaporative concentrator with dry, inert nitrogen flowing over the surface. After concentrating to 500 µL., 250 µL. were transferred to a micro-insert vial in the autoinjector and 100 µL. were injected into the high performance liquid chromatograph.

The instrument, column, and gradient conditions are as follows:

Instrument: Waters Associates - Model 440 (uv) detector at 254 nm. and 313 nm.

Accessories: "Wisp" 710B auto-injector and the Model 720 System Controller with Data Module.

Column: Reversed phase, Beckman "Ultrasphere" - ODS - (C_{18}) - 5 micron - 25 cm. x 4.6 mm. I.D.

Conditions: 40-100% CH_3CN/H_2O - 55 min. run - 1.0 mL/min. flow rate; Chartspeed: 1.0 cm./min.

Fourteen polynuclear aromatic hydrocarbon (PNA) stock standards were prepared individually from pure standard material in methylene chloride. Three working solutions (0.2-11.0 ng/μL concentration) were prepared in acetonitrile by diluting appropriate amounts of the stock solutions. The working solutions were injected preceding and following the six sample analysis run.

The fourteen PNA's prepared were:

1) Naphthalene
2) Acenaphthylene
3) Fluorene
4) Acenaphthene
5) Phenanthrene
6) Anthracene
7) Fluoranthene
8) Pyrene
9) Chrysene
10) 1,2-Benzanthracene
11) Benzo(a)pyrene
12) 1,2:5,6-Dibenzanthracene
13) Indeno (1,2,3-c,d) pyrene
14) Benzo [g,h,i] perylene

Each PNA has a characteristic absorbance peak response ratio between 254 nm. and 313 nm. This ratio, in addition to the retention times, was used to identify the PNA. The results on the six water samples showing their corresponding PNA concentrations were tabulated using integrated area counts or peak-height measurements. The results are shown on the attached table.

The reported concentrations for some PNA's are higher from the analyses performed by HPLC than those performed by GC/MS. The values reported from the HPLC analyses are probably high due to two or more compounds being present under one peak.

W. R. White

W. R. White
Chemist

PNA Concentrations of Minnesota (St. Louis Park) samples

(µg/L)

Sample	Naphthalene	Acenaphthylene	Fluorene	Acenaphthene	Phenanthrene	Anthracene	Fluoranthene
W-13	*220,000	**<5,250	*110,000	*D-I (interference)	*630,000	66,000	*420,000
P-14	*270	<2.0	*6.3	*20	*1.8	0.10	<0.30
Flame Ind.	**<0.019	<0.02	**<0.002	**<0.036	*0.01	<0.001	0.04
W-117	**<0.018	<0.02	<0.002	*4.9	<0.001	<0.001	<0.007
SLP #15	0.07	**<0.02	*0.73	**<0.035	*0.11	0.07	0.07
SLP #4 (GC/MS did not analyze this sample)	<0.018	<0.02	<0.002	<0.036	<0.001	<0.001	<0.007

* Detected by GC/MS and by LC
** Detected by GC/MS, not by LC
< Less than minimum detectable limit. Dilution factors are included where applicable.

PNA Concentrations of Minnesota (St. Louis Park) samples (con.)
(µg/L)

Sample	Pyrene	Chrysene	1,2 Benzanthracene	Benzo(a) pyrene	1,2:5,6 Di-benzanthracene	Indeno-(1,2,3-c,d) pyrene	Benzo [g,h,i,] Perylene
W-13	*500,000	**<360	*300,000	*160,000	16,000	27,000	*92,000
P-14	0.85	<0.14	<0.12	<0.18	<0.27	<0.09	<0.29
Flame Ind.	<0.006	<0.001	<0.003	<0.005	<0.012	<0.002	<0.007
W-117	<0.006	<0.001	<0.003	<0.004	<0.012	<0.002	<0.007
SLP #15	<0.006	<0.001	<0.003	<0.005	<0.012	<0.002	<0.007
SLP #4	<0.006	<0.001	<0.003	<0.005	<0.012	<0.002	<0.007

* Detected by GC/MS and by LC
** Detected by GC/MS, not by LC
< Less than minimum detectable limit. Dilution factors are included where applicable.

CHEMIST'S REPORT II

Six samples were received from the Minnesota District for acid/base-neutral extractables and volatiles analyses (one sample, [redacted] #4, for acid/base-neutral extractables was received broken). The samples for acid/base-neutral extractables were adjusted to pH 11 and extracted with three 50 mL portions of methylene chloride (extracts for each sample were composited). The samples were then adjusted to pH 2, saturated with 50 mL di-ethyl ether, and extracted as above with three 50 mL portions of methylene chloride. (NOTE: Sample W-13 contained a visible organic layer which was emulsified and co-extracted with the water phase. Due to the dark coloration of this sample, the interface between the extraction solvent and the water phase was difficult to determine. Consequently, the extracts containing the base-neutral components were conservatively withdrawn leaving an ambiguous emulsion. The emulsion was withdrawn into a separate flask to avoid contamination during the acid component extractions. This emulsion was not composited with the base-neutral extracts, but is believed to contain a great deal of the base-neutral components. Therefore, estimated concentration figures listed should be presumed to be minimum values.)

The composited extracts were reduced using a Kuderna-Danish concentrator and further reduced to approximately 0.5 mL using a nitrogen evaporator. Sample nos. P-14 and W-13 were known to be heavily contaminated and were diluted 1:10 and 1:2000 respectively for base-neutral analyses and 1:10 and 1:20 respectively for acid analyses. The extracts were submitted for gas chromatography/ mass spectrometric analysis.

10 µg of the internal standard, d_{10}-biphenyl, were added to each extract (or 0.5 mL aliquot of the diluted extract). Approximately 1 µL of the extract was injected onto a 25m x 0.25mm i.d. SE-54 coated fused silica capillary column using the Grob (splitless) injection technique. The gas chromatograph was temperature programmed as follows: Initial temperature 50°C hold for 5 min., program to 300°C at 6°C/min., hold 300°C for 15 min. The mass spectrometer was scanned from 35 to 450 amu at 1 sec/scan. Peaks of interest were determined using the Biemann-Biller search routine. Spectra were tentatively identified using a computer assisted search of the National Bureau of Standards (NBS) mass spectral library. Those spectra meeting specified "Purity" and "Fit" criteria are given tentative identification in the accompanying tables. "Purity"and "Fit" are indicators of how closely the unknown spectrum resembles the library spectrum with the best possible value for each beins "1000". Concentrations were estimated by comparing the base peak of the internal standard (m/e 164) with the base peak of the identified spectrum, assuming a relative response factor of 1.0. The concentration estimates may be considered to be accurate to the nearest order of magnitude. The detection limit for this method is on the order of 1 µg/L for all compounds except for diluted samples P-14

and W-13, for which the detection limits for the base-neutral analyses would be 10 µg/L and 2000 µg/L respectively and for the acid analyses would be 10 µg/L and 20 µg/L respectively.

Samples for volatiles analyses were analyzed per "Determination of Selected Volatile Organic Priority Pollutants in Water by Computerized Gas Chromatography-Quadrapole Mass Spectrometry" by W. Pereira and B. Hughes as published in the Journal of the American Water Works Association, April, 1980. The samples were analyzed quantitatively for the following compounds and qualitatively for all others reported: (— on the volatiles tables indicates no quantitation was done.)

Methylene Chloride
Cyclohexane
Benzene
Trichloroethene
Toluene
Ethylbenzene

The detection limit for volatile compounds is on the order of 1 µg/L for all samples analyzed.

Michael Brooks

Michael Brooks
Chemist

There is no cost for these analyses in accordance with the agreement made by our previous laboratory chief. Rolly Grabbe had recommended that we request samples from you to test our new PNA method on waters containing detectable quantities of PNA's and to test our GC/MS method, used for oil shale retort waters, on the coal tar waste waters.

If you have questions, please call Rolly Grabbe at FTS 234-4992.

Howard E. Taylor
Chief, Denver Central Laboratory

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Attachments

cc: H. Feltz, WRD, Reston, VA
Analytical Services Coordinator, Reston, VA
Chief, Atlanta Central Laboratory
Regional Hydrologist, NE, Reston, VA
Regional Hydrologist, CR, Denver, CO

Table 1.

SLP #15

Scan	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Base-Neutral:				
629	2,3 dihydro-1H-indene	922	992	1
841	4-methyl-2,3-dihydro-1H-indene	920	950	<1
1203	biphenyl	885	898	<1
1259	dimethylnaphthalene	913	926	<1
1300	acenaphthylene	931	954	1
1349	acenaphthene	978	989	1
1390	dibenzofuran	943	980	1
1477	fluorene	915	955	1
1715	phenanthrene	664	858	<1
Acid:				
541	phenol	922	962	4
Volatiles:				
59	methylene chloride	975	993	9
154	pentane	939	958	--
220	benzene	457	985	1
220	trichloroethene	490	996	2

Table 2

Flame Ind.

Scan	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Base-Neutral:				
639	2,3-dihydro-1H-indene	824	954	<1
901	naphthalene	976	996	1
917	1-(2-butoxy ethoxy)ethanol	855	984	15
1350	acenaphthene	910	924	<1
1479	fluorene	881	915	<1
1716	phenanthrene	709	818	<1
Acid:				
534	phenol	940	982	1
Volatiles:				
58	methylene chloride	800	976	5
169	1,1,1-trichloroethane	498	743	—
219	benzene	669	986	1
219	trichloroethene	---	---	<1
304	tetrachloroethene	396	794	<1

Table 3

W-117

Scan	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Base-Neutral:				
224	tetrachloroethene	974	998	25
360	xylene	942	992	2
423	(1-methylethyl)benzene	919	970	<1
532	ethylmethylbenzene	915	985	1
640	2,3-dihydro-1H-indene	910	994	30
722	dihydrobenzofuran	815	896	<1
734	methyl-2,3-dihydro-1H-indene	867	994	3
756	7-methylbenzofuran	906	978	2
763	3-phenyl-2-propenal	915	994	1
772	2-methylbenzofuran	871	967	1
845	methyl-2,3-dihydro-1H-indene	813	955	2
854	1,2,3,4 tetrahydro-1,4-methano-naphthalen-9-one	868	933	1
902	naphthalene	920	973	<1
910	dimethyl-2,3-dihydro-1H-indene	851	895	<1
927	dimethyl-2,3-dihydro-1H-indene	869	925	<1
1018	2,3-dihydro-benzo/B/thiophene	917	996	2
1059	2,3 dihydro-1H-indene-1-one	847	992	<1
1068	methylbenzo/B/thiophene	919	984	1
1102	methylbenzo/B/thiophene	888	966	<1
1157	diethylphenol	807	916	1
1164	dimethyl(methylethyl)benzene	785	953	<1
1184	2-(2 methyl-2-propenyl)phenol	804	929	<1
1254	pentamethylbenzene	840	928	<1
1350	acenaphthene	942	992	2
1688	3-methyl-2(1H)-quinolinone	813	906	<1
1755	4-methyl-2(1H)-quinolinone	803	876	<1
Acid:				
529	phenol	926	981	1

Table 3 (con.)

W-117

	Volatiles:			
69	methylene chloride	821	981	9
87	dichloroethene (3 isomers)	784	990	—
124	dichloroethene	971	997	—
134	dichloroethene	978	997	—
154	pentane	787	907	—
169	cyclohexane	854	961	2
219	benzene	---	---	10
220	trichloroethene	922	995	500
305	tetrachloroethene	976	995	280
316	toluene	882	956	<1
363	ethylbenzene	834	969	<1

Table 4

P-14

Scan	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Base-Neutral:				
259	cyclohexanone	867	890	<10
291	ethylbenzene	944	998	500
305	xylene	922	987	400
319	dimethylthiophene	893	961	<10
351	xylene	922	983	250
415	(1-methylethyl)benzene	941	997	30
438	methyl cyclohexanol	848	972	<10
459	2-propenylbenzene	907	947	<10
491	ethylmethylbenzene	899	997	100
505	trimethylbenzene	920	996	50
525	aniline	929	998	10
527	ethylmethylbenzene	849	925	30
539	benzonitrile	835	996	30
555	ethylmethylbenzene	905	975	300
562	benzo furan	863	958	400
612	trimethylbenzene	893	994	50
639	2,3-dihydro-1H-indene	910	994	300
659	1H-indene	914	981	700
680	2-methylphenol	931	997	150
723	3-methylphenol	894	983	300
744	trimethyl-2-cyclopenten-1-one	794	967	<10
756	methylbenzofuran	902	978	50
766	3-phenyl-2-propenal	926	994	100
775	dimethylphenol	873	997	300
828	1-methyl-2,3-dihydro-1H-indene	795	823	20
830	ethylphenol	686	950	100
836	ethylphenol	933	995	100
846	3-methylindene	904	959	50
854	dimethylphenol	891	993	350
858	1,2,3,4-tetrahydro-1,4-methano-naphthalen-9-one	845	864	50
866	dimethylphenol	830	935	500
894	ethylphenol	848	947	250
911	naththalene	852	923	850
915	dimethylphenol	831	937	150
937	1,6-dimethyl-2,3-dihydro-1H-indene	720	773	<10

Table 4 (con.)

P-14

Base-Neutral:

948	trimethylphenol	881	988	200
963	dimethylbenzo furan	825	921	<10
983	ethylmethylphenol	853	989	150
988	trimethylphenol	866	982	200
1001	ethylmethylphenol	890	998	350
1007	ethylmethylphenol	844	985	250
1039	ethylmethylphenol	835	997	350
1047	trimethylphenol	893	996	150
1054	trimethylphenol	878	994	200
1063	diethylphenol	720	919	<1
1071	2,3-dihydro-1H-indene-1-one	929	997	50
1087	2-methylnaphthalene	868	997	500
1112	2-methylnaphthalene	873	978	400
1155	dimethylbenzaldehyde	797	993	200
1209	biphenyl	914	989	100
1214	p-(2 methylallyl)phenol	811	948	20
1220	pentamethyl benzene	806	956	50
1229	2-ethylnaphthalene	808	972	30
1244	dimethylnaphthalene	803	948	20
1265	dimethylnaphthalene	637	951	30
1270	dimethylnaphthalene	813	864	20
1292	dimethylnaphthalene	835	967	10
1313	dimethylnaphthalene	870	979	10
1321	hexamethylbenzene	780	921	20
1356	acenaphthene	934	990	20
1368	triethylbenzene	696	944	10
1388	2-naphthalenol	795	984	50
1395	1,1'-biphenyl-2-ol	774	936	30
1397	dibenzofuran	808	876	100
1399	1-naphthalenol	868	980	100
1429	fluorene	896	974	40
1456	2-methylnaphthalenol	865	967	10
1477	1-methylnaphthalenol	618	910	10
1503	4-methylnaphthalenol	665	911	<10
1657	phenanthrene	933	970	100
1721	9-H-carbazole	885	989	30
1759	dibenzo/B,E/1,4/dioxin	804	891	<10

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Table 4 (con.)

P-14

Acid:					
536	✓	phenol	958	976	10
675		methylphenol	927	993	40
719		methylphenol	892	979	150
766	✓	dimethylphenol	870	991	<10
824		2-ethylphenol	951	995	20
843		dimethylphenol	898	992	100
884	?	dimethylphenol	887	987	150
916		dimethylphenol	913	995	100
925	?	3-chlorophenol	921	998	30
991		ethylmethylphenol	740	951	10
1025		ethylmethylphenol	866	987	40
1050		benzene acetic acid	900	968	30
1089		3-methylbenzoic acid	872	985	20
1095		4-methylbenzoic acid	699	776	<10
1246		dimethylbenzoic acid	608	917	<10
1411		methylpropylphenol	705	883	10
1604		2-naphthalencarboxylic acid	841	970	<10
1621		1-naphthalencarboxylic acid	845	927	30

Volatiles:

✓58		methylenechloride	885	992	8
169		cyclohexane	691	908	<1
182		thiophene	840	985	--
195		cyclohexene	928	975	--
✓219		benzene	948	972	110
✓220		trichloroethene	---	---	1
242		cycloheptene	891	907	--
259		methylcyclohexane	777	981	--
268		tetrahydro-2-methyl thiophene	754	983	--
278		3-methyl thiophene	868	975	--
✓305		tetrachloroethene Perchloroethylene	573	957	<1
✓315		toluene	928	994	56
332		ethylthiophene	833	980	--
✓362		ethylbenzene	865	949	160
367		dimethylthiophene	603	870	--
373		dimethylthiophene	874	960	--

Table 5

W-13

Scan #	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Base-Neutral:				
314	ethylbenzene	954	996	2,000
328	xylene = dimethylbenze	937	995	6,000
370	xylene	938	983	2,000
502	ethylmethylbenzene	907	994	2,000
514	trimethylbenzene	931	991	2,000
536	ethylmethylbenzene	886	907	2,000
562	trimethylbenzene	921	991	4,000
567	benzofuran	852	919	4,000
576	hydrocarbon			*
616	trimethylbenzene	938	993	2,000
624	2-propenylbenzene	893	920	<2,000
640	2,3-dihydro-1H-indene	915	988	20,000
656	1-H-indene	947	987	20,000
681	methylphenol	924	982	<2,000
685	isopropylmethyl benzene	912	977	<2,000
720	methylphenol	767	978	2,000
754	7-methylbenzofuran	930	970	<2,000
760	hydrocarbon			*
763	3-phenylpropenal	946	993	2,000
786	tetramethylbenzene	937	967	<2,000
825	4-methyl-2,3-dihydro-1H-indene	897	996	2,000
845	5-methyl-2,3-dihydro-1H-indene	699	948	4,000
847	dimethylphenol	881	950	2,000
853	methylindene	897	955	2,000
885	dimethylphenol	875	986	2,000
907	naphthalene	896	993	230,000
930	hydrocarbon	---	---	*
933	5,6-dimethyl-1H-benzeneimidazole	842	911	<2,000
952	hydrocarbon	---	---	*
954	4,7-dimethylbenzofuran	856	949	<2,000
964	hydrocarbon	---	---	*
992	ethylmethylphenol	775	940	<2,000
1008	1,3-dimethyl-2,3-dihydro-1H-indene	869	938	<2,000
1031	4,7-dimethyl-2,3-dihydro-1H-indene	625	846	<2,000
1046	hydrocarbon	---	---	*

Table 5 (con.)

W-13

Base-Neutral:

1067	5-methyl-benzo/B/thiophene	943	984	2,000
1080	2-methylnaphthalene	914	997	120,000
1085	hydrocarbon	---	---	*
1091	6-methyl-benzo/B/thiophene	897	944	2,000
1105	1-methylnaphthalene	898	977	4,000
1204	biphenyl	927	988	20,000
1224	2-ethylnaphthalene	856	972	10,000
1230	hydrocarbon	---	---	*
1239	dimethylnaphthalene	924	994	20,000
1250	3,6-dimethylbenzo/B/thiophene	720	900	<2,000
1261	dimethylnaphthalene	915	995	10,000
1265	dimethylnaphthalene	924	994	10,000
1287	dimethylnaphthalene	918	993	6,000
1300	acenaphthylene	912	982	4,000
1308	dimethylnaphthalene	878	966	4,000
1316	hydrocarbon	---	---	*
1352	acenaphthene	931	988	8,000
1366	hydrocarbon	---	---	*
1395	dibenzofuran	913	990	60,000
1410	trimethylnaphthalene	819	944	4,000
1483	fluorene	884	964	40,000
1494	hydrocarbon	---	---	*
1503	1-(2-propenyl)naphthalene	849	932	2,000
1526	methyldibenzofuran	837	963	8,000
1543	methyldibenzofuran	902	978	10,000
1554	hydrocarbon	---	---	*
1596	dehydrophenanthrane	912	974	6,000
1611	dihydrophenanthrene	815	973	2,000
1615	hydrocarbon	---	---	*
1620	methylfluorene	890	982	6,000
1622	hydrocarbon	---	---	*
1629	methylfluorene	684	916	4,000
1642	methylfluorene	697	959	2,000
1668	hydrocarbon	---	---	*
1678	hydrocarbon	---	---	*
1685	dibenzothiophene	780	966	10,000
1722	phenanthrene	939	984	110,000
1731	hydrocarbon	---	---	*
1733	anthracene	899	957	2,000
1741	hydrocarbon	---	---	*

35-12

Table 5 (con.)

W-13

Base-Neutral:				
1781	9-H-carbazole	813	973	10,000
1804	1-phenylnaphthalene	754	905	2,000
1820	methyldibenzothiophene	734	940	2,000
1840	hydrocarbon	---	---	*
1845	methylphenanthrene	908	974	8,000
1852	methylphenanthrene	895	980	8,000
1877	methylphenanthrene	722	879	6,000
1926	2-phenylnaphthalene	869	967	4,000
1946	hydrocarbon	---	---	*
1962	dimethylphenanthrene	766	926	<2,000
1972	dimethylphenanthrene	715	946	<2,000
1991	dimethylphenanthrene	771	959	2,000
2025	fluoranthene	956	994	4,000
2046	hydrocarbon	---	---	*
2077	pyrene	944	985	2,000
2168	methylpyrene	844	964	4,000
2185	methylpyrene	890	943	2,000
2190	methylpyrene	605	857	2,000
2212	methylpyrene	808	955	<2,000
2220	methylpyrene	797	933	<2,000
2235	hydrocarbon	---	---	*
2279	1,1':2',1" terphenyl	713	860	<2,000
2321	benzo/B/naphtho/2,1-D/thiophene	858	938	<2,000
2332	benzo/C/phenanthrene	783	851	<2,000
2383	benz/A/anthracene	917	981	4,000
2393	chrysene	856	952	4,000
2644	benzo/K/fluoranthene	848	883	<2,000
2701	perylene	879	891	<2,000
3017	benzo/g,h,i/perylene	752	813	<2,000

*"hydrocarbon" refer to a series of alkanes which cannot be distinguished by mass spectrometry - Total estimated concentration 70,000 µg/L.

29-4:2

Table 5 (con.)

W-13

Acid:				
539	phenol	958	991	50
679	methylphenol	911	992	60
720	methylphenol	895	981	300
846	dimethylphenol	602	992	20
884	dimethylphenol	895	984	100
921	dimethylphenol	651	852	<20
1028	ethylmethylphenol	756	915	<20
1030	benzeneacetic acid	876	960	20
1036	methylbenzoic acid	694	923	40
1096	methylbenzoic acid	762	911	100
1604	2-naphthalene carboxylic acid	771	987	20
Volatile:				
58	methylene chloride	758	976	5
154	pentane	945	960	--
170	cyclohexane	917	972	8
182	thiophene	831	938	--
215	methylcyclopentene	820	859	--
218	benzene	921	950	240
242	cyclo heptene	838	885	--
259	methylcyclohexane	892	994	--
268	tetrahydro-2-methyl-thiophene	794	879	--
278	methylthiophene	837	962	--
312	toluene = methyl benzene	866	980	270
332	dimethylcyclohexane	754	923	--
359	trimethylcyclohexane	532	963	--
361	ethylbenzene	788	912	370
365	dimethylthiophene	708	823	--
367	methylheptane	897	979	--
372	dimethylthiophene	694	954	--
394	dimethylheptane	925	992	--

Table 6

SLP #4

Scan #	Tentative Identification	Purity	Fit	Est. Conc. (µg/L)
Volatiles:				
58	methylene chloride	890	995	12
153	pentane	911	949	—
219	benzene	742	987	1
220	trichloroethene	---	---	<1
304	tetrachloroethene	265	818	<1
325	trimethylbenzene	837	965	—
395	trimethylbenzene	883	993	—
397	trimethylbenzene	820	994	—

Acid/Base-neutral (sample received broken).